THE TRI-CREEKS WATERSHED STUDY

Alberta

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PURPOSE OF RESEARCH

The harvesting of timber as a renewable resource is a significant economic activity in Alberta. The construction of roads and the removal of trees from watersheds can have detrimental effects on stream environments, and aquatic ecosystems. A major objective of forest land management is to minimize this impact. The purpose of the Tri-Creek Watershed study is to test the effectiveness of existing environmental controls on logging operations in Alberta. The results of research will be of benefit to forest land managers.

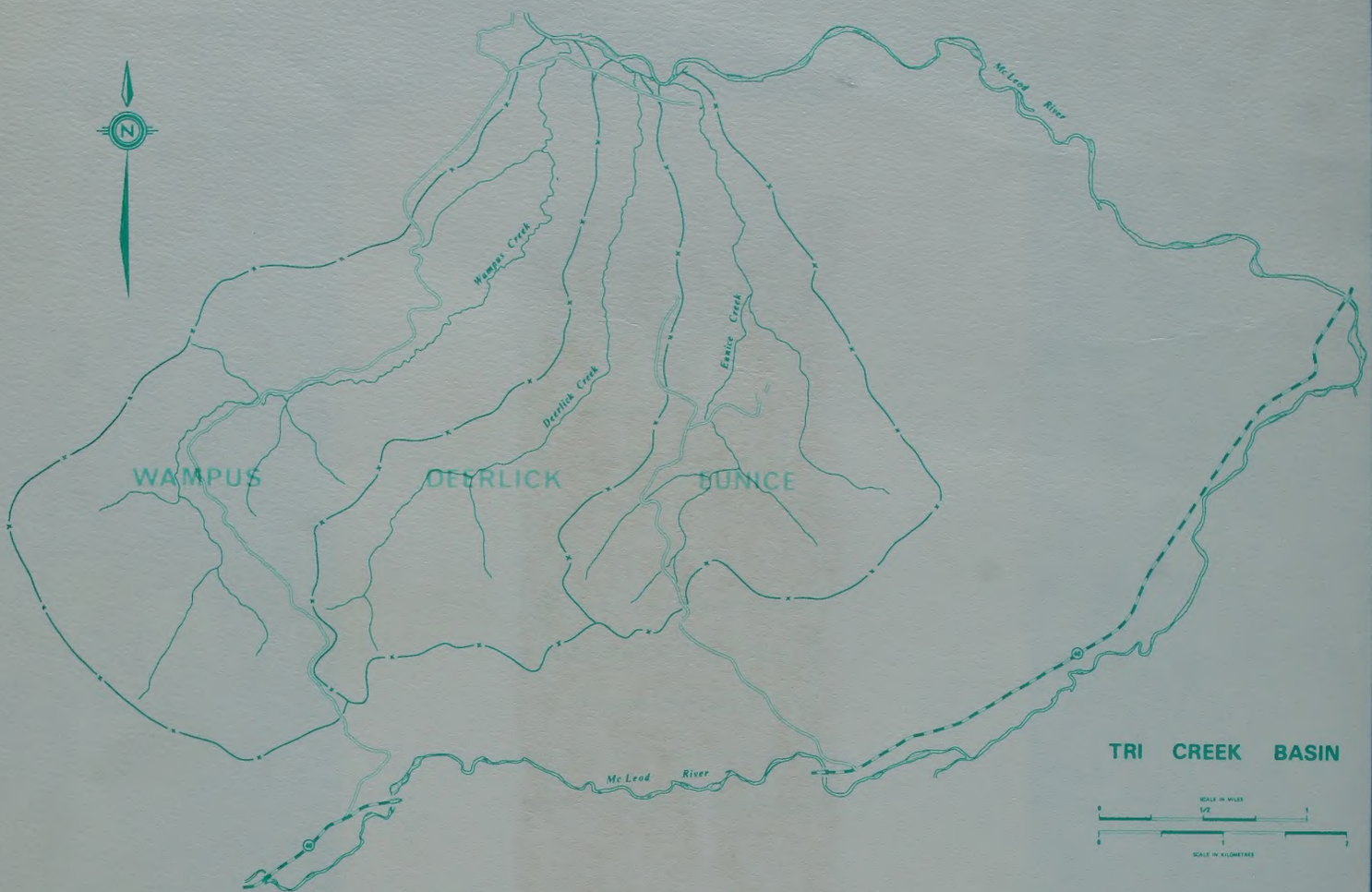
THE RESEARCH AREA

The Tri-Creek Watershed is a 23-square mile tract of forest land situated in west-central Alberta, about 25 miles south-east of the town of Hinton. It consists of the watersheds of three small tributaries of the McLeod River; Wampus Creek, Deerlick Creek, and Eunice Creek.

The climate and physiography of the study area are representative of the Rocky Mountain foothills region.

Annual precipitation averages 26 inches, of which 40 percent occurs as snow. This produces an average annual streamflow of 10,400 acre-feet.

Elevations range from 4130 feet at the McLeod River confluence to 5524 feet at the headwaters of Deerlick Creek. Glacial tills derived from local bedrock are found above the 4600-foot contour. Luvisolic, loamy soils have developed on the till deposits. Lodgepole pine is the predominant tree species associated with these soils; white spruce, Englemann spruce, and sub-alpine fir are also represented.



Glaciolacustrine silts occur at the lower elevations. Luvisolic, clay-loam soils have formed on these glacial-lake deposits. Forests of lodgepole pine occur on the lower valley slopes while black spruce stands occupy the flat, poorly-drained sites.

Areas of groundwater discharge are characterized by springs, seeps, and hummocky ground. Gleysolic soils have formed in these locations and support black spruce, Labrador tea, and feathermosses. Alluvial soils occur in the valley of Wampus Creek and are covered by meadow-vegetation consisting of sedges, grasses, willows, and birches.

The streams support resident populations of native rainbow trout. Wampus Creek is particularly productive, having an average of 50 trout per 100 feet of stream in its upper section. However growth rates are extremely slow. For example, 8-9 year old trout have an average maximum length of 10 inches. Factors limiting growth include food abundance, water temperatures, length of growing season, available space, and fish population densities.

Significant movements of rainbow trout occur during the spring spawning period. Most fish move less than 1500 feet to spawn. Of the number of eggs deposited by female trout, about 35 percent develop into fry that emerge from the spawning gravels. Only 0.5 percent of these fry survive their first year in the stream.

Dolly Varden char are also common to the study streams. Mature char, reaching a weight of 5 pounds, over-winter in the McLeod River and move into the lower reaches of the streams to spawn.

Other fish species occurring in the streams include mountain whitefish, brook trout, spoonhead sculpin, longnose dace, and burbot.

Mayflies, stoneflies, and caddisflies comprise 65 percent of the invertebrate populations of the streams.

DATA COLLECTION

The pre-treatment phase of research has involved the collection of climatic, hydrologic, water quality, and biological data. Together with various special studies that have been carried out, this information will provide the basis for evaluating the effects of logging on streamflow, water quality, and fish populations.

Measurement of streamflow

Native rainbow trout of Tri-Creeks

Electrofishing to determine fish populations

Trap used to determine fish movements

Measurement of precipitation

Trap used to collect fry emerging from spawning gravels

Nets used to catch drifting aquatic insects

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THE LOGGING OPERATION

Timber harvesting operations are scheduled to begin in the autumn of 1977, and will be conducted by Northwestern Pulp and Power Limited of Hinton.

Timber will be harvested in the Wampus Creek watershed according to existing ground rules governing logging practices in the N.W.P.P. forest management area. Reserve strips of uncut timber will be left along permanent streams.

A similar operation will subsequently be conducted in the Deerlick Creek watershed, except that streamside timber associated with the cut-blocks will be removed.

Eunice Creek will serve as the control watershed in the study and as such will remain undisturbed.

The evaluation phase of the study will document the effects of logging on populations of fish and aquatic invertebrates.

The effects of logging on stream-flow quantity and timing, suspended sediment concentrations and stream channel siltation, inorganic and organic chemical constituents, and water temperature will also be evaluated, since any impacts on the fishery will be caused by changes in the physical and chemical environment of the streams.

The Tri-Creek Watershed Study is coordinated by Alberta Energy and Natural Resources — Forest Service. Major cooperating agencies include Alberta Parks, Recreation, and Wildlife — Fish and Wildlife Division, and Northwestern Pulp and Power Ltd.

Other cooperating agencies include Environment Canada — Inland Waters Division, Atmospheric Environment Service; Alberta Environment and Alberta Research Council.

Additional information on the study can be obtained by contacting the Tri-Creek Coordinator, Alberta Forest Service, Natural Resources Building, Edmonton; or the regional offices of the Forest Service and the Fish and Wildlife Division in Edson.

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